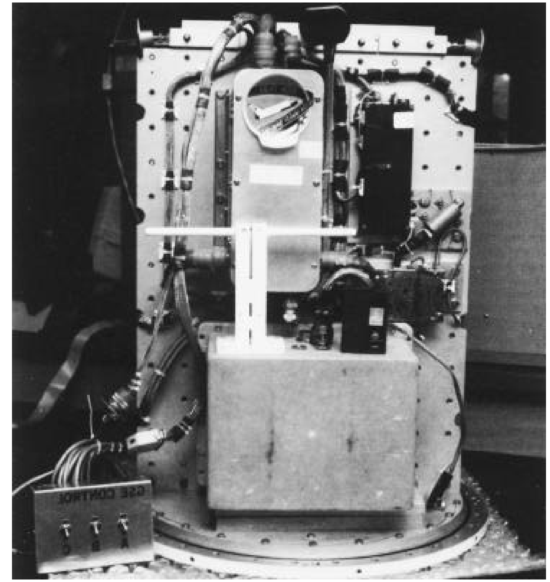
G-007

23

Customer: Alabama Space and Rocket Center; Edward O. Buckbee
Payload Mgr: Konrad K. Dannenberg
NASA Tech Mgr: Jack J. Gottleib
Mission: STS-41-G, October 5, 1984

From this mission, the Project Explorer payload (G-007) attempted to transmit radio-frequency measurements to ground-based radio hams around the world. The unique experiment was built by the Marshall Space Flight Center Amateur Radio Club (MARC). The other experiments in G-007 were created by Alabama university students, guided by the Alabama-Mississippi section of the American Institute of Aeronautics and Astronautics and four major Alabama universities. These experiments investigated the growth of a complex inorganic compound with exceptional conductive properties (potassium tetracyanoplatinate); the solidification of an alloy with superplastic properties (lead-antimony); and the germination and growth of radish seeds in space. Unfortunately, the payload did not operate, but because the problem did not stem from a customer error, Project Explorer was awarded a reflight on STS-61-C.



The “box” to the left of the t-shaped antenna was a Digitalker, which turned G-007’s data into voice signals.

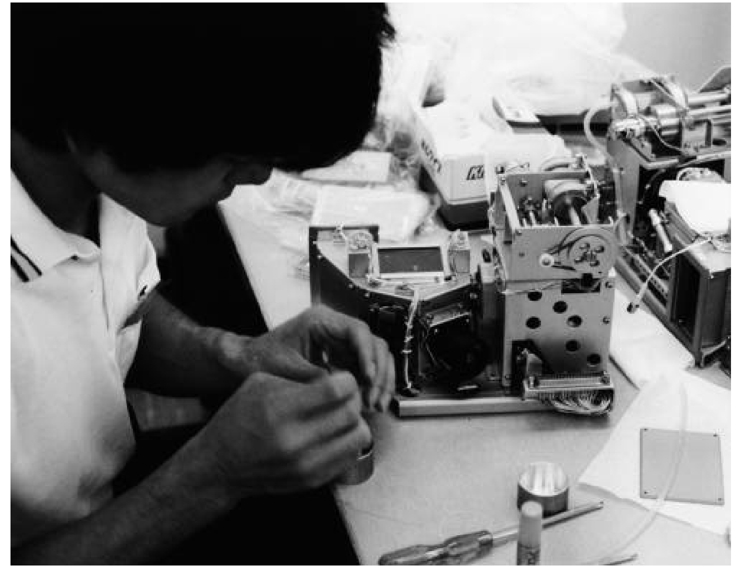
G-032

24

Customer: International Space Corp.; Drazen M. Premate
Payload Mgr: Asahi National Broadcasting Co., Ltd.; Kuzuo Fujimoto
NASA Tech Mgr: Mark D. Goans
Mission: STS-41-G, October 5, 1984

What happens when BBs are shot at free-standing spheres of water in microgravity? Would they be repelled by the water's surface tension? Would they burst the water ball? Knowing that surface tension holds water in a spherical shape in microgravity, the Asahi National Broadcasting Company designed an experiment to answer these questions. Their experiment generated water balls and then fired stainless steel BBs at them at varying speeds. In recording the impacts, they would learn more about the strength of surface tension in the absence of gravity.

In a different vein, a second experiment in their payload used five small electrical furnaces to produce new materials—a lead-zinc allow, a glass composite (or ceramic) and crystals of an indium-antimony mixture.



A Nippon Electric Company engineer prepared G-032.

G-306

25

Customer: Dept. of Defense Space Test Program; Col. Richard B. Kehl
Payload Mgr: Dr. James Adams
NASA Tech Mgr: Richard J. Palace
Mission: STS-41-G, October 5, 1984

Skylab Missions in 1973 and 1974 observed an unexpectedly large flux of heavy ions (electrically charged ions of oxygen and heavier atomic elements) capable of upsetting the microelectronic circuits on satellites. Payload G-306, the Trapped Ions In Space (TRIS) experiment, recorded the tiny radiation damage tracks left by such ions as they passed through a stack of track-detecting plastic sheets during flight. Upon return to Earth, the tracks were etched chemically, revealing cone-shaped pits where particles had passed. Investigators then studied the pits to deduce the energies and arrival directions of the different types of ions collected by TRIS. Sponsored by the U.S. Air Force, TRIS was a joint project of the Cosmic Ray Astrophysics Group at the Naval Research Laboratory and the U.S. Naval Academy's Sigma Pi Sigma Physics Honors Society.

Lorraine Beahm of the Naval Research Laboratory prepared the Trapped Ions In Space payload.

G-038

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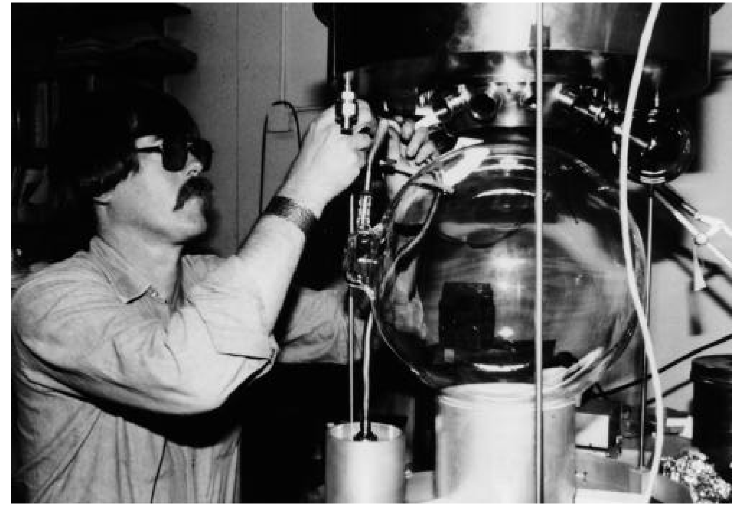
Customer: Marshall-McShane;
Joseph W. McShane
Payload Mgr: Joseph W. McShane
NASA Tech Mgr: Timothy Premack
Mission: STS-41-G, October 5, 1984

Space Art: Artists who want to use GAS payloads for aesthetic purposes first must satisfy the program's scientific experimental requirements. Through his unique payload, artist Joseph McShane did both—performing valuable research while realizing his desire to capture essence of space for those who are Earth-bound. McShane used vacuum deposition techniques to coat eight glass spheres with gold, platinum, and other metals to create lustrous space sculptures. His deposition process was similar to that used on Earth to coat lenses, glass, and mirrors, but the vacuum and weightlessness of space allowed a highly uniform coating that was just a few microns thick.

A ninth control sphere was evacuated to the natural vacuum level of space and sealed. Once back on Earth, McShane could take measurements from it to determine the vacuum level at which the depositions had occurred. This sphere—rather, the "pure space" within it—was particularly meaningful to McShane, for it allowed individuals to contemplate space firsthand.



Artist Joseph McShane assembled his experimental space sculpture.

G-518

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Customer: Utah State University;
Bartell C. Jensen
Payload Mgr: Dr. L. R. Megill
NASA Tech Mgr: Alan Lindenmoyer
Mission: STS-41-G, October 5, 1984

The ability to refly GAS experiments within a short turn-around period was demonstrated by Utah State University (USU) students on their G-518 payload. Four USU experiments flown as two different payloads on STS-41-B were reconfigured into this single payload, which flew just four months later on STS-41-G. The brief time between flights might be one of the fastest turnaround for space experiments in NASA history; it certainly was for any university program associated with the shuttle. The experiments explored several basic physical processes in microgravity: capillary waves caused when water is excited; separation of flux and solder; thermocapillary convection; and a fluid flow system in a heat pipe experiment.

USU student Scott Thomas readied his thermocapillary experiment.

G-074

28

Customer: McDonnell Douglas Astronautics Company; Henry E. Duehlmeirer
Payload Mgr: George F. Orton
NASA Tech Mgr: Alan Lindenmoyer
Mission: STS-41-G, October 5, 1984

Creating a more versatile, inexpensive way of supplying fuel to spacecraft engines was the goal of this McDonnell Douglas payload. Its experiments demonstrated two methods of delivering partially full tanks of liquid fuel, free of gas bubbles, to engines that control and direct orbiting spacecraft. These zero gravity fuel system tests were particularly concerned with studying the fluid dynamics of liquid fuels in tanks during the course of the mission.

(L to R) Technician Chris Noll and project manager George Orton prepared their payload for a vibration test.

G-469

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Customer: Goddard Space Flight Center;
Noel W. Hinners
Payload Mgr: Norman E. Peterson, Jr.
NASA Tech Mgr: Norman E. Peterson, Jr.
Mission: STS-41-G, October 5, 1984

CRUX III evolved from the earlier Cosmic Ray Upset Experiments flown on STS-8 and STS-41-B. A cooperative effort by IBM Corporation and Goddard Space Flight Center, CRUX III tested four different types of advanced, state-of-the-art microcircuits, totaling over 12 megabits. These devices were expected to be more sensitive to cosmic ray upset than those flown previously. Additionally, STS-41-G's angle of inclination provided for measurements at high latitudes, where the cosmic ray spectrum isn't shielded by Earth's magnetosphere. Thus, the cosmic ray environment was harsher by orders of magnitude than it had been for the previous CRUX payloads carried at lower latitudes.

G-469 was mounted on a side-wall carrier, otherwise known as a GAS Beam Assembly, in the orbiter bay.